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THE I.C.I. MAGAZINE

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OUR CONTRIBUTORS

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Henry Maxwell *was trained as a barrister and is now head of I.C.I.'s Internal Relations. Outside office hours two of his main interests are railways and cross-Channel steamers.*

Making Plastics Tick

By the Editor

Plastics have not reached the point where they are today without the closest co-operation between polymer-maker and polymer-user. Both learn from each other, and out of this partnership a new conception of technical service has evolved.

"HERE we are at the Palace of Industry," said my driver as we pulled up at the entrance to Plastics Division's Technical Service and Development Laboratories at Welwyn, now in their second working year.

It was a not entirely inappropriate description. Wide, shallow steps led up to a glass swing door opening on to a cool, spacious hall of "contemporary" design. Two young men and a girl sat in earnest discussion round a table at the foot of the spiral stairs, their background a huge photograph of the Wilton oil cracker covering the wall behind them like a stage backcloth. Through another set of swing doors I caught a glimpse of a brightly coloured passage flanked on one side entirely with plate glass windows looking on to a shop floor where white-coated technicians were busy putting moulding presses and extrusion machines through their paces. It was in all a pleasing example of functional beauty.

To understand the thinking that is behind this impressive £500,000 investment it is necessary to look first at I.C.I.'s own success story.

Plastics Division sells today as wide a range of plastics as any company in the world and sells the biggest tonnage of plastics of any company outside the United States. It accounts for approximately one-third of the total British plastics business. Polythene sales have risen from a few hundred tons in 1946 to close on 50,000 tons a year at the present time. Excluding polythene, sales of other plastics by Plastics Division have increased by over five times since World War II.

Between them these plastics find their way into a myriad uses—into kitchenware, cold water piping, toys, telephones, radios, TV sets, wrapping film, lighting fittings, illuminated signs, corrugated transparent roofing, curtains, raincoats, tarpaulins, leathercloth, non-inflammable conveyors, gramophone records, plugs and sockets, lavatory seats, cabinets, brush tufting—the list seems never-ending. In fact, there is today hardly a single material aspect of modern life on which plastics do not impinge.

What are plastics? They have one thing in common: they are composed of particularly large molecules whose composition is a multiplication of identical components strung together in a long chain. This phenomenon occurs when a bunch of identical, or nearly identical, molecules called the monomer fuse together through the influence of a catalyst and heat (and in the case of gases under pressure as well) to become a single but bigger long-chain molecule called the polymer. Sometimes as many as 10,000 monomer units go to make one polymer molecule.

The job of making the polymer varies from one type of plastic to another. Some are made by complicated continuous processes: others in batches in large stirred vessels, often built to withstand high pressure and called autoclaves.

In the autoclave the ingredients are cooked up together, sometimes with the addition of water, and the product that emerges may be a melted plastic which is allowed to harden like toffee and then chipped up, or it may consist of tiny particles like sand mixed up with water which are filtered off and dried, or yet again it may turn up as a solution or a milky emulsion from which the water is evaporated and the polymer obtained as a fine powder.

It is such a powder or chip, usually with the addition of colours and often a softening agent and various protective chemicals as well, that the Plastics Division's customer heats up in an extrusion machine (a good everyday example of extrusion is a kitchen

Main entrance *of the Technical Service Laboratories. The building is a steel structure clad with Holoplast and glass.*

The main office corridor. *Large windows on the right look down on to the shop floor, where moulding machines and extrusion presses are put through their paces.*

mincing machine) or in a moulding press to become a sticky molten material which when cooled sets hard.

That this is possible is because polymers have no sharp melting point, such as occurs when ice becomes water. Instead, they pass slowly from a solid to a liquid state, and thus there is a stage when they are neither solid nor liquid but a little of both, with some rubbery properties thrown in for good measure. This is when the plastic is made to take the shape in which it finally sets, being sufficiently malleable to be capable of moulding but sufficiently firm to retain the shape into which it has been formed. On cooling, that shape is finally "frozen" into a solid.

If we could look at them under a sufficiently powerful magnification, the heated polymer molecules would look rather like a mass of enormously long worms closely entangled with one another, heaving and wriggling here and there in thermal agitation but unable to break away from one another because of their length and cohesion.

A technical officer *studies an experimental sample. Through the plate glass he can see the experimental work in which he is interested actually going on.*

The precise behaviour of a plastic in the moulding machine or in the extrusion press cannot, however, be predicted from theoretical calculation. This knowledge comes only from trial and experiment. Hence the existence of a large Technical Service and Development Department at Plastics Division today.

The department commands a team of some 70 technical officers, most of whom are university science graduates. Some have come to the department straight from university, but more often than not the route is via Research Department, where the young university graduate first finds his feet in industry and where his personal qualities can be assessed. Others have "come up the hard way," graduating from laboratory assistant to assistant technical officer, learning their science in night classes; or recruited from outside after gaining experience with a plastics fabricator.

Together they form a team of technical experts whose function is an important one. It is not just a

question of advising a particular manufacturer on how to surmount his particular headache of the moment. The nub of the matter is rather this: that only by the stimulus of contact between polymer-user and polymer-maker and through the sharing of problems does the plastics industry itself find out what uses plastics can and should be put to, and the manufacturer find out in which directions his materials should be developed and improved. This in turn has led to different grades of the same plastic being put on the market, each grade being tailored to particular needs.

The story of how these grades have evolved is in itself an interesting one. There are two approaches. One is to add to the polymer another substance which will help produce the desired quality. Thus, to obtain a softer polyvinyl chloride (P.V.C. for short) one adds an agent called a plasticiser which will transform a rigid-setting polymer into one that sets soft and pliable. A wholly new range of uses is thus opened up.

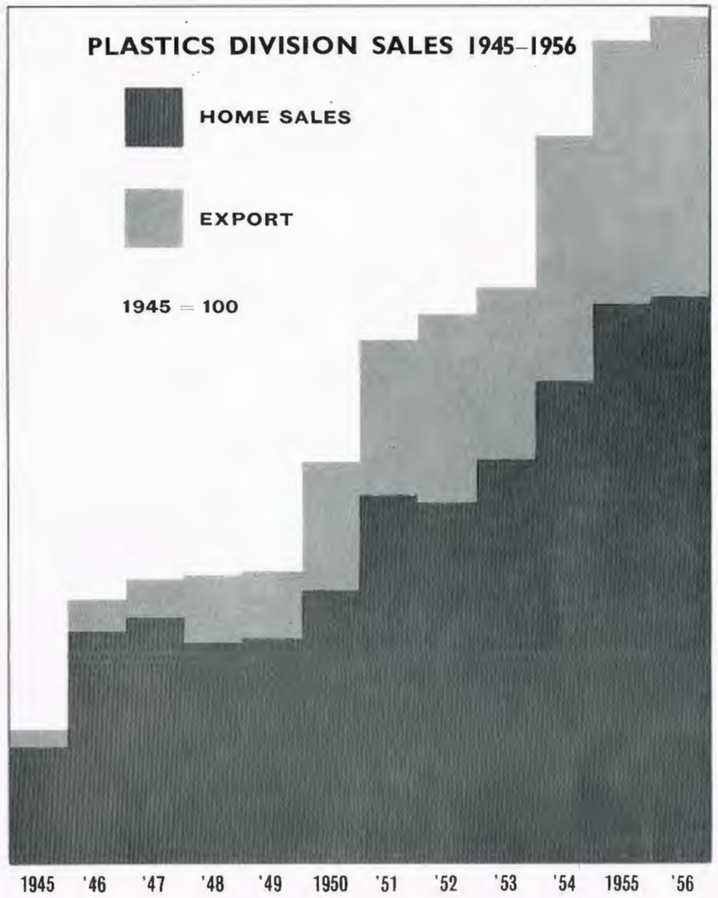
The other approach is to produce a polymer which, although chemically similar, will in fact behave differently. It has been found that a slight change in the conditions under which polymerisation takes place will lead to a molecule of different weight and make-up. This in turn leads to different behaviour by the polymer in the molten stage.

Sometimes this will have embarrassing consequences, as Plastics Division will admit when they talk of a minor and otherwise hardly detectable change in a polymer which thereupon refused to co-operate in the manufacture of a crinolated lampshade material. It just would not "crin." But patient research has paid off. As a result plastics are now much more versatile than they used to be. Plastics Division today markets no fewer than fourteen different grades of P.V.C. A few years ago there were only three. Each of these fourteen grades is designed for a different set of uses.

Let us look at two examples of the sort of problem these technical officers tackle—problems that will generally resolve themselves into one of two categories, "trouble-shooting" or "long-haired," i.e. curing the immediate headache or working out a new answer.

The scope of the direct technical service problem varies enormously. It may be that a small fabricator is in trouble because of lack of familiarity with his material or that a large organisation is entering the field of plastics fabrication for the first time. Again, a firm already engaged in one branch of plastics application may want to take up another. Sometimes there are complaints about the quality of the product; at other times a visit may have been arranged to observe the performance of a competitive material which the customer thinks performs more satisfactorily under his particular conditions. All these situations require

(*Continued on page* 385)



An operator *about to put a sheet of coloured 'Perspex' into an oven in order to heat it up so that it becomes soft and can be shaped*

One man and his job—57

Shovel Driver

Jack Harrot, a quiet man in his early fifties, with a friendly grin and a soft Derbyshire accent, has been working for Lime Division and its predecessor, The Buxton Lime Firms, for just on thirty-seven years. His first job at the age of 14 was at East Buxton quarry (now closed down), driving the horse-drawn carts then used for carrying the limestone from the quarry face to the kilns: now he drives an electric shovel at Tunstead.

Tunstead Quarry, opened in the early 1930s for the special purpose of getting large tonnages of first-class limestone for Alkali Division's soda ash works over in Cheshire, became fully mechanised ten years ago. It is now the largest and most up-to-date quarry in Europe this side of the Iron Curtain. Jack, who was working as a quarry chargehand in one of the hand-loading teams when the changeover took place, was one of the first men to be trained on the new electric shovels.

Tunstead has four of these shovels and eight regular drivers who work a two-shift system (six in the morning until two in the afternoon and from two to ten at night).

Spaced out along the one and a half miles of quarry face, which towers anything from 120 ft. to 160 ft. high, the shovels are completely dwarfed. It is only as you get up close to one that you realise that it is a giant in its own right—the cab alone is about the size of a single-decker bus. And talking of buses, there is enough power in the shovel's mechanical arm to overturn a bus.

"So you want to drive the shovel?" said Jack Harrot.

Another glance at the monster and I amended this to "I want to see how it is done." I climbed up the 10 ft. iron ladder, stowed myself away in a corner of the driver's cabin, and for the next half-hour watched Jack put the shovel through its paces.

Slowly he swings the cab round to the rock pile, at the same time letting out the hoist and dipper sticks which control the mechanical arm and bucket. It seems like a highly complicated driving lesson. Then back with a full bucket-load (about five tons), which is discharged into a lorry drawn up alongside. Four loads, and the lorry is full. Jack gives the signal—a rather cheeky little hoot—and the lorry is off on its way to the crushing plant. The next lorry then moves up into position. The whole operation takes less than ten minutes.

I noticed that Jack kept a wary eye on the pile of rock in front of us. A large piece of rock, balanced precariously, was "tickled" gently with the edge of the bucket until it fell away harmlessly to the bottom of the heap. "A job for the progglers," said Jack. These were the men I had seen working further along the quarry face. Their job is to break down the outsize boulders. They do this by drilling holes and filling them with small charges of explosive. Then three times a day these are blasted. At the sound of the blasting warning all the men take refuge in small beehive huts about a hundred yards from the quarry face.

A big blast, which brings down about 50,000 tons of stone, is less than a week's work for Jack and his fellow drivers—a far cry from the not so distant days when all the stone had to be sorted and loaded by hand (as it still is at Hindlow Quarry). Even the best loaders are reckoned to load only two tons an hour. Derbyshire tends to get more than its fair share of bad weather in winter, but with shovels on the job work can go on just the same. They even work after dark by means of floodlights on the front of the shovel.

As I was driven away from the quarry face I looked back. Way up above, silhouetted against the skyline, were the well-drilling rigs already preparing for the next week's blast. Down below, at the quarry face, Jack's shovel was at work again, steadily reducing the aftermath of the last explosion.

A.E.B.

Jack Harrot

COMPETITION IN PETROLEUM CHEMICALS

By E. W. Talbot (Development Department)

I.C.I.'s huge investment in chemicals derived from petroleum—£70 million has already been spent on the Wilton site and a target of £100 million has been announced—is today meeting increasing competition. Leading oil companies and others have also invested heavily in this field. Several of these projects are now "on stream" and others on the threshold of production.

In the last ten years the chemical industry has expanded faster than any other British industry. Its volume of production has doubled since 1946 and trebled since 1938. This rapid growth has been possible only by the expenditure of very large sums of money on new plant and equipment. The total thus spent during the last decade (excluding mineral oil refining) is of the order of £650m., of which a considerable proportion has been contributed by I.C.I.

A large part of this expansion—particularly the more recent expansion—has been in products based on petroleum. The use of petroleum fractions as chemical raw materials was boosted by the post-war decision of the oil companies to set up large-scale refineries in Britain. The gases ethylene and propylene—these two gases are the chief starting materials or "building blocks" of petroleum chemicals—may be obtained as by-products of normal refinery operations. It is, however, often more satisfactory to erect special plant for "cracking" (i.e. breaking down) the molecular structure of a petroleum distillate.

The term "petroleum chemicals" indicates only the source of the raw material. The final products seem to have little in common. Among them are solvents, fertilizers, carbon black, plastics, fibres, film, detergents, synthetic rubber and anti-knock compounds.

Owing to the special nature of their raw material, petroleum chemicals do not fit neatly into existing classifications. A chemical manufacturer who wishes to make petroleum chemicals may buy a petroleum distillate and crack it; or he may buy ethylene or propylene as required. A petroleum refiner may content himself with the sale of a distillate; he may erect a special cracker to obtain ethylene and propylene for sale; or he may go further and undertake the manufacture of petroleum chemical intermediates or end-products. This last alternative may be more profitable, but it also involves greater risks and unfamiliar marketing problems. One way of overcoming this difficulty is the formation of a working partnership between a chemical manufacturer and an oil refiner. The pattern that is now beginning to emerge in the petroleum chemical field is a mixture of all these variants.

. . . petroleum fractions

The "big three" in the British oil-refining industry—Shell, British Petroleum and Esso—have each adopted different policies in relation to petroleum chemicals. Shell have launched out on their own. Through their subsidiary, Shell Chemical Company, Shell are now producing a widening range of chemicals. British Petroleum have formed a joint subsidiary with the Distillers Company for the manufacture of petroleum chemicals. Esso are—for the present, at any rate—confining their activities to the supply of petroleum-derived intermediates to chemical manufacturers.

At Stanlow Shell operate a special cracker in addition to using by-products from their local refinery operations. Ethylene is made for sale, but propylene is used for an extensive range of chemical solvents. Synthetic detergents are made from a distillate obtained by cracking paraffin wax. At Shellhaven Shell have embarked on one of their biggest single chemical projects, a £6½m. ammonia plant. About 60,000 tons of the 75,000 tons a year of ammonia to be produced there will go to Fison's new fertilizer plant at Mucking, Essex. The remaining 15,000 tons Shell will use themselves to make their own granular nitrate-limestone fertilizer. A plant for producing 30,000 tons a year of alkyl benzene (an intermediate in the manufacture of synthetic detergents) has also come into operation at Shellhaven.

Petrochemicals Ltd., which in 1955 became a fully owned subsidiary of Shell, have erected a pilot plant for making 1000 tons a year of polythene by the Ziegler low-pressure process, for which they hold an exclusive licence in this country. The pilot plant will enable them to test the process, estimate costs and evaluate the market.

Petrochemicals are also to put up a £1¾m. plant for the production of styrene monomer to come on stream in 1958. Part of this will be used for the production of polystyrene moulding powders by one of their subsidiaries, and some of the remainder may be supplied to the International Synthetic Rubber Co., to which further reference is made below.

. . . obtained by cracking . . .

Another plant to be erected by Petrochemicals is for the production of 25,000 tons of ethylene oxide a year by the direct catalytic oxidation of ethylene. It will cost about £3m., and about 10,000 tons a year will be converted into ethylene glycol and the rest into other derivatives.

The British Petroleum Company's approach to the problem has been to go into partnership with the Distillers Co. Their jointly owned subsidiary, British Hydrocarbon Chemicals, occupies a site adjoining the B.P. refinery at Grangemouth and draws the feedstock for its cracker from the refinery. The production of ethanol and isopropanol from the cracker gases started in 1951. New plant has recently been completed which doubles the capacity of the previous cracker. Ethanol capacity has been increased to 60,000 tons and isopropanol capacity to 30,000 tons a year.

British Hydrocarbon Chemicals are also financially interested in several other petroleum chemical plants. Jointly with Monsanto they own Forth Chemicals, which now produce 30,000 tons a year of styrene monomer. Another of their subsidiaries is Grange Chemicals, in which the Oronite Chemical Co. of California (a subsidiary of Standard Oil of California) own a minority interest. At the end of 1955 this company completed a 10,000-ton-a-year alkyl benzene plant.

Among the major new projects of British Hydrocarbon Chemicals is an 11,000-ton-a-year polythene plant which will use the (American) Phillips Petroleum Co.'s low-pressure process. At the same time the company will supply ethylene to another polythene plant, now under construction at Grangemouth by Union Carbide Ltd., a subsidiary of the (American) Union Carbide Corporation. This plant will have a capacity of 11,500 tons a year and cost about £4¼m.

The total investment of British Hydrocarbon Chemicals (including their share in subsidiaries) will be about £22m. when the present expansion plans are completed.

Esso will be the last of the three big oil companies to produce chemicals from petroleum in the U.K. It was announced a year ago that Esso are to spend £9m. in the next two years on a plant at Fawley to process 250,000 tons of oil a year. Ethylene will be piped to two plants which will be erected on adjoining sites: a 10,000-ton-a-year high-pressure polythene plant of the Monsanto Chemical Co. and a 20,000-ton-a-year plant of Union Carbide Ltd. for ethylene oxide, ethylene glycol and other derivatives. Butadiene will be supplied to the International Synthetic Rubber Co. formed by the principal British tyre manufacturers for the purpose of making 50,000 tons a year of synthetic rubber. This rubber will be a general-purpose product of the American GR–S type.

This ends the list of the oil companies' published activities and plans in the petroleum chemical field but it does not, of course, exhaust the list of firms interested in petroleum chemicals.

One of the first special crackers to be built in this country was that erected at Spondon by British Celanese. It serves to provide British Celanese with acetaldehyde, acetic acid, acetic anhydride and acetone—raw materials needed for their acetate rayon and plastics production.

. . . serves to provide . . .

Associated Ethyl Co. (in which Shell hold a minority interest) draw ethylene from Shell's Stanlow plant to make intermediates used in the manufacture of tetraethyl lead. Styrene from Grangemouth is supplied to certain subsidiaries of the Distillers Co. and to Monsanto for the production of polystyrene. These two companies are also engaged (or about to engage) in the manufacture of synthetic rubbers of a type similar to the I.C.I. 'Butakon' range.

Enough has been said to indicate that I.C.I. has no monopoly of petroleum chemicals manufacture, and during the next few years competition will increase sharply. The market, however, is growing so quickly that there is every justification for feeling confident that the output of all the new plants will be fully absorbed. Indeed, there is still scope for further expansion, and capital expenditure may be expected to remain high for many years to come if full advantage of opportunities is to be taken.

FOAMS AND THEIR FUTURE

By K. A. Lunn (Dyestuffs Division)

One of the more intriguing "chemical wonders" is the family of foams now marketed by Dyestuffs Division. These foams have many uses. In the flexible form they are invaluable for mattresses, carpet underlays and crash padding. And as rigid foams they add strength with little weight, and so have a future in aeroplane construction and the building trade.

ORGANIC isocyanates* are hitting the headlines in the technical press now that a big new plant built specially for making these versatile chemicals has come into production at Dyestuffs Division. The characteristic feature (chemically) of all isocyanates is the presence in their molecules of one or more NCO groups. (No military significance about this: NCO simply indicates a nitrogen, a carbon and an oxygen atom attached in that order!)

It is the presence of these NCO groups that makes the isocyanates so very active chemically. When allowed to react with various polymers, they give a whole series of novel and extremely interesting materials which are already making considerable impact on a wide range of established industries and products. Their versatility is so remarkable that it is difficult to imagine an industry or trade where they are incapable of valuable application in some way or other.

Most advanced in development, and likely to prove a major outlet for isocyanates, are the flexible foams. These polyurethane foams, so called because of their chemical composition, can readily be cut into any shape and bonded as required. Alternatively, the chemicals can be sprayed on before setting as foam. The foams are remarkably strong and durable, and moreover it is extremely difficult to set them on fire. For these reasons they are useful for all kinds of upholstery—for carpet underlays and crash padding in vehicles; for mattresses, life-jackets and thermal insulation; for garment interlinings, brassière linings and artificial busts; for paint rollers; and for a thousand and one other things.

Another use is in the protective packaging of fragile goods such as glassware and radio valves and in liners for egg baskets. Finally, to complete the tale of their virtues, the flexible foams stand up to oil and petrol, which makes them ideal for washers, gaskets and oil seals.

Rigid polyurethane foams are perhaps even more fascinating materials than the flexible foams. They can be made extremely light yet very strong, and they open up vast new possibilities, especially in the field of thermal insulation. These foams have the same general chemical and physical characteristics as the flexible foams except that they are rigid. Their main attraction is that they can be made on the spot where required, thus doing away with the need for transporting bulky preformed blocks.

For the filling of cavities such as refrigerator walls, buoyancy chambers in lifeboats and aircraft wings, all you have to do is to mix the two chemicals together—ordinary bucket and stick methods suffice—and pour the mixture into the cavity to be filled. The foam is generated, fills the cavity, sets rigid, and sticks. Firm bonding to the cavity surfaces makes the foam an integral part of the structure, contributing strength and often permitting a lighter framework. In aeroplane wing assembly, filling with rigid polyurethane foam can do away in many cases with riveting, giving a simpler internal construction and a smoother external wing surface with better airflow characteristics. Strong rigid foams weighing as little as 2–3 lb. per cubic foot—and remember, water weighs over 62 lb. per cubic foot—are perfectly easy to make. The foam density can, of course, be controlled.

Like their flexible brothers, the rigid members of the foam family also stand up to oil and petrol, and in spite of their rigidity they too have an unusual capacity for absorbing mechanical shock. Their actual or potential uses include, besides those already mentioned, sound insulation panels, lightweight walls and ceilings, use as a substitute for plaster in building, anti-condensation coatings, and shock-absorbing fillings for safety helmets.

Semi-rigid foams with similar properties can also be made. They are expected to be in big demand for protective packaging.

Isocyanates are also used along with certain polyesters to produce a novel class of soft synthetic rubbers of great value in special applications such as printers' rollers and as printers' blankets. The new type of printers' roller so produced is vastly superior to the traditional gelatine roller. It takes the ink better, is little affected by humidity changes, is easy to clean, and can be run at much higher speeds.

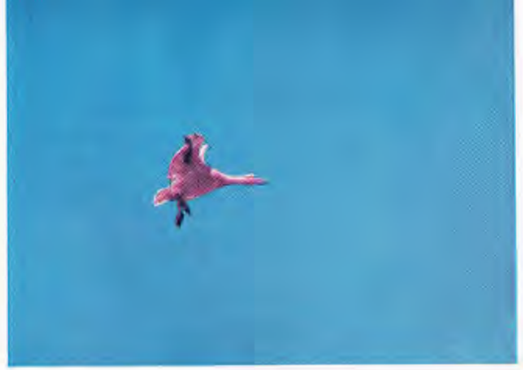
* I.C.I. isocyanates and their polymers are sold under various names—'Suprasec,' 'Daltocel,' 'Daltolac,' 'Daltorol,' etc.

This is no trick photograph. *A rigid foam block larger than herself is easily lifted by this child.*

Then there are the polyurethane varnishes and lacquers which set new standards of durability and versatility. It is just as easy to make a tough polyurethane coating that is soft and rubbery as one that is hard and horny. Both possess the characteristic of attaching themselves firmly to almost any surface; and "difficult" metals to coat, such as aluminium, are no longer a problem. Nylon, too, and 'Terylene' are just as easily managed. Coated with polyurethane compositions, they make a most useful and attractive fabric whose uses range from "handbag" rainwear to lightweight nylon "tarpaulins" of great strength, pliability and efficiency.

An electrical application of importance is the use of isocyanates along with castor oil for the "potting" of delicate electronic devices in order to immobilise and support them mechanically and protect them from atmospheric moisture. Electronic devices in aircraft, guided missiles, radio and television equipment often require protection in this way, and the isocyanate/castor oil compounds have both excellent electrical properties and high resistance to mechanical shock.

Dyestuffs Division's interest in isocyanates dates back to the early days of the war. Parallel investigations in this field were going on, it was later learned, in both Germany and the U.S.A., but I.C.I.'s 'Vulcaprene' A was the only product at that period to be commercially produced. It was used for certain important special purposes, and was made available to industry in general in 1946. The present developments represent a tremendous advance on this early work, with a far wider scope, and while it is always rather foolish to speak of "wonder chemicals," there is no doubt that the various isocyanate/polymer products made from I.C.I. materials are going to produce some great changes in many industries and in many established engineering practices, as well as in the goods we actually see and buy in the shops.



Coloured Geese in the Sky

From a United States Correspondent

THE California Department of Fish and Game, with the co-operation of the U.S. Fish and Wildlife Service, has developed an unusual and efficient method of marking geese for identification purposes as they migrate to the Arctic each summer.

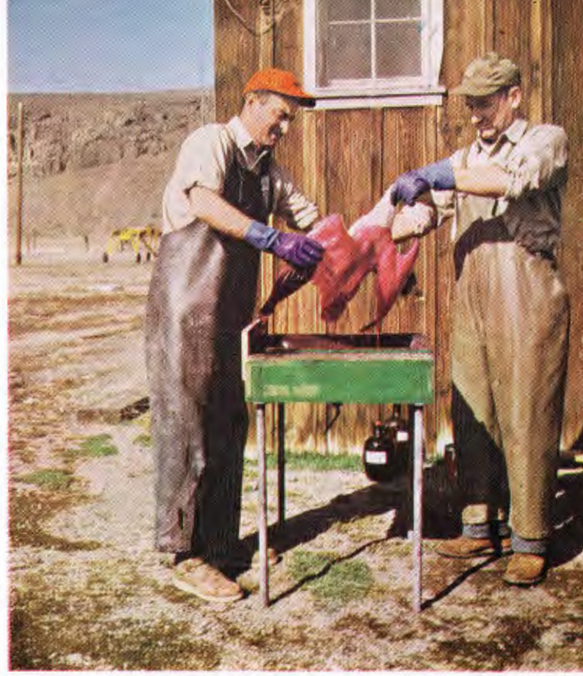
The snow goose, an all-white bird, is dipped into an aniline-alcohol dye and then released in strong colour which can be seen for miles. An extremely accurate account of the routes of the birds as they fly north is thus a simple matter. The general public gets quite excited when they see a pink or purple goose and immediately relays the information to the authorities. Frank Kozlik, director of the project for the State of California, says: "Last year the Eskimos were pretty startled to see the pink and yellow geese, but this year they seem to be taking it in their stride." The project was started in the spring of 1955, with 83 birds dyed. Observers' reports were so satisfactory that during the 1956 season 435 birds were dipped.

The birds are trapped by baiting a field with barley and firing a concealed net, by mortar, out over them. A good catch runs to more than 75 birds, which are then transported to the dye sheds. After being dipped (tail and wing feathers only) they are kept in a heated shed overnight to dry. They are then released near the water, where they either swim or fly away. Their white brothers seem to pay no attention to the colours.

All this takes place near the northern border of California at the Tule Lake National Wildlife Refuge.

Snow geese *feeding in a field at sunset are scared off by a watcher. The idea is to make them settle instead in the field where the trap is set.*

The net *is fired by mortar over birds which come in to feed on barley*



Tail and wing *feathers only are dipped, but the dye soon spreads*

Released *near the water, the dyed snow goose flies away*

The pink 'uns *startle the general public but not their fellows*

Match Fishing

By Brian Halliday

Izaak Walton's "contemplative man" would take a poor view of the modern match angler. He fishes in a crowd, to the clock, and does what the stewards tell him. But he enjoys it.

Photographs by Erich Auerbach

You may some time or other have noticed from the car or the train a line of motionless and apparently immobile figures dotted at regular intervals along a river bank as far as the eye can reach. This may have been rather more than a line of anglers: it may have been an angling match.

Fishing matches have been going on, in England at any rate, since 1860, and they have become so increasingly popular that there are now few stretches of water long enough to cope with the numbers that wish to fish. Fishing matches are rigidly controlled. Fishing for an exact period of time in one fixed spot flanked by neighbours on either side, supervised by stewards, restricted by all sorts of regulations and watched by spectators, seems very far removed from the pastime of the "contemplative man" as Izaak Walton knew it.

Contests range from the lighthearted events of the small club, where the winning of the main trophy may easily prove a very expensive business for the successful angler, to the very serious "open" contests and other eagerly sought championships. These larger events call for formidable organisation and are invariably excellently managed.

Birmingham Association limit their main contest to 5000 entrants, spread over various sections of their waters with careful synchronisation. The annual Trent Championship, open to licence holders, is limited to the first 2000 entries received; this match, fished in mid-September, is usually fully entered by April or May of each year.

In the 42nd annual National Championship run by the N.F.A. this year in the Severn at Bridgnorth there were some 100 associations, each consisting of a team of twelve anglers. The competition to get into any of these teams was extraordinarily keen, especially in cases where an association had had several successes in

Lighting the maroon *at Bridgnorth was the signal for 1200 anglers to start fishing the Severn in the 42nd annual National Championship*

He is dreaming *of the year they caught two tons of fish at Bridgwater. But this year at Bridgnorth they just won't bite.*

Half-past three, *and so far no one has caught anything much bigger than a sprat—not even the free-lance who is fishing from the bridge*

the series. Gold medals, numerous silver cups, and other trophies were at stake and the prize money totalled about £2000. But by far the greatest attraction is always the championship title that goes to the individual winner and to the team with the greatest weight of fish.

Some idea of the skill of our best anglers and some idea of the splendid condition of a few of our rivers can be gathered from recent results. In the Witham in 1956 the total catch by 1128 anglers was just over a ton. At Bridgwater in the previous year the total catch was 1 ton 16 cwt. 4 lb., while the three leading rods each had more than a hundredweight of fish.

Match fishing is not always like this. I have taken part in smaller matches where on account of flood or other impossible fishing conditions there was not a single fish taken. At Bridgnorth this year, for instance, there were flood conditions, and the winning team's catch weighed only 20½ lb. On one extraordinary occasion I was the only angler to catch fish!

From this does one correctly assume that match fishing is all a matter of luck? Absolutely not so. The only luck there is in match angling is the luck of the draw, and in some canalised rivers this scarcely exists. Apart from drawing a good place (and a good angler will often make a winning stake out of a very average draw), match angling is purely a matter of skill. Nineteen matches out of twenty are won by the clever, experienced match fisher: you will note that I say "match fisher." An angler may have a very fine fishing record and may be clever at catching fish under lone conditions, but the same man might be absolutely lost in a contest.

Match fishing is by no means a haphazard affair. For each hour spent in actual fishing the crack angler will have spent two or three in preparation. He goes to endless trouble to ensure a state of preparedness for every possible eventuality or change of weather or water, and he is ready to cope with any type of fish likely to be found in his particular "swim."

He may take a dozen kinds of baits with him, although the most favoured bait for contest fishing is perhaps the maggot or larva of the common bluebottle. These must be neither too fresh nor too stale;

Long faces *surround the scales as the fish are weighed. The flooded river has kept the catch down to less than 8 oz. per man.*

they must be scoured and polished and repolished and stained or coloured red, or brown, or pink, or green, or yellow, or even left white. Thousands of gallons of such maggots are bred and distributed each week-end of the fishing season.

Match anglers literally cast their bread upon the waters. During a contest competitors endeavour to attract fish by frequently tossing in small quantities of "ground bait," which clouds the water and stays in suspension a considerable time. The bait is composed of finely ground bread or biscuit or other material with a grain base. During an average national championship each competitor may throw into his swim anything from ten to twenty or more pounds of ground bait. Four or five tons of bait go into a river during this five-hour contest. And should any angler find the bream feeding in his stretch, then 20 lb. of ground bait may be all too little to hold them feeding there while he steadily takes toll.

But even if the catch *was poor, somebody had to win*

In all events staged by a reputable angling body the whole of the catch must be returned alive to the water after being weighed. Should an angler fail to keep his fish alive, his catch is disallowed.

People and events . . .

WHY did 'Ardil' fail? And why was it necessary to run a full-scale plant at a loss for six years before abandoning the project?

These are questions many people must have asked themselves when the Company announced that the 'Ardil' plant was to close. DR. A. CARESS, chairman of Fibres Division, answers them frankly in a note written specially for the *Magazine*:

"The protein fibres, which is the class of fibre 'Ardil' belongs to, have shown some unexpected limitations now that a good deal of research has been done on them. The main fault of 'Ardil' itself, which was intended as a large-scale, low-priced substitute for wool, is its low strength—and, what is even more serious, its loss of strength when wetted.

* * *

"Gradual improvement in these properties was made over the years, and this encouraged us to go on with the project. Then a way of improving the fibre's strength and durability even more was discovered, and we decided to give this new variety, 'Ardil' M, a run for its money.

"The laboratories at Dumfries and Harrogate, and some selected customers, gave 'Ardil' M prolonged trials, but they were disappointing—there was not enough difference between 'Ardil' M and ordinary 'Ardil' to convert a loss into a profit.

"In fact 'Ardil' is still technically successful in blends with cotton and viscose. It was advertised and sold for these applications in this country and abroad, but the sales in these markets alone are not big enough to cover rising costs of manufacture and raw materials."

Dr. Caress sees the shutdown of the 'Ardil' plant as a sobering reminder that not every scientific discovery can be translated into a commercial success, even if research effort is lavished on it.

Certainly few fibres could hope to rival the success of 'Terylene.'

The third, entirely new, 'Terylene' plant which is to be built at Wilton at a cost of about £20,000,000 is the latest move in the game of leapfrog between demand and production which has been going on ever since the fibre came on the market. This is how it has gone:

1. Late 1954. The first unit, with a capacity of 11 million lb. per annum, came into operation.
2. Early 1956. The second unit, raising capacity from 11 to 22 million lb., came into operation.
3. Late 1958. A further extension, authorised by the I.C.I. Board last year, due to go into operation, raising output from 22 to 30 million lb.
4. 1960. The third unit, authorised 26th September this year, due to be producing another 20 million lb., bringing total capacity to 50 million lb.

Channel Plan

A LONG-DISTANCE swimmer from C.I.I.'s Montreal office is planning to swim the English Channel early next year.

He is MR. BILL MELLOF, an assistant market analyst who has already made some epic swims in Canada. His most recent achievement was to swim from Montreal to Sorel, Quebec—a distance of 45 miles—in 14 hours 45 minutes.

After that the Channel should prove easy. Perhaps I.C.I. in Britain could find some pacemakers for Mr. Mellof? After all, it is only 21 miles and it's very good for the figure. The last I.C.I. man to swim the Channel, a Plastics Division foreman named Sam Rockett, lost 8 lb. during the trip.

Industrial Hygiene

BEFORE a new chemical compound from any of the I.C.I. research laboratories is put into production it is essential to know if it offers any hazard to life or health. For this reason all new compounds are investigated for toxicity at the Company's Industrial Hygiene Research Laboratories at Welwyn.


Dr. Goldblatt

The Laboratories enjoy an enviable reputation, and they are the only ones of their kind and size in the Commonwealth. Recently the man who was given the job of starting them up in 1945, and who has been at their head ever since, retired.

DR. M. W. GOLDBLATT did memorable work as medical officer of Dyestuffs Division for ten years before moving to Welwyn. But it was at Welwyn that his main work was done. He became an authority on industrial toxicology and was known and respected in many countries. He was made a C.B.E. in 1955, and is a past president of the Association of Industrial Medical Officers.

A forceful personality who is seldom silent, Dr. Goldblatt has a natural gift for languages—in the course of a discussion he is apt to break into French, Italian, German or some other language that interests him at the time. His range of learning is wide and his enthusiasm great. His declamatory style is not easily forgotten; one of his colleagues claims that he will remember Maurice Goldblatt's incantation of "Five chlor orthotoluidine" much as Jim Hawkins remembered "pieces of eight."

Dr. Goldblatt was a schoolmaster for a time before taking a medical course at St. Thomas's and working there on physiological problems under Professor John Mellanby. He has never forgotten those days as a schoolmaster and spends much time and thought in the encouragement of the young.

He is now going to advise the Medical Research Council on certain aspects of industrial medicine.

Turn of the Screw

A HUNDRED years ago Britain adopted Joseph Whitworth's standards for screw threads, thereby sparing successive generations of engineers some grief and grey hairs.

Unfortunately the Whitworth thread never crossed the Atlantic. American standards grew up independently, and although the folly of having different standards on each side of the Atlantic had long been apparent it was not until the last war that anything was done about it.

That is why Britain, the U.S.A. and Canada signed a Declaration of Accord in 1948 to unify screw threads (Sir Ewart Smith signing for British industry). This month I.C.I. formally announces the adoption of the unified screw thread, and from now on Divisions will begin to make the change as they order new threaded components, bolts and nuts.

Billingham Division decided to make the change two years ago and has made good progress, but in the Company generally the changeover will take several years to complete.

The Things They Say!

AN Oxford chemistry don reports this instance of I.C.I.'s fame.

His daughter was sitting on the top of a London bus when she heard the girl behind say to her companion: "What does I.C.I. mean?" "I *think* it means Imperial Chemical Industries" was the reply.

The don's daughter glanced over her shoulder to see what had prompted the

enquiry, and saw in a shop window the words "Ici on parle Français."

There can be few I.C.I. people who have not overheard similar rather odd conversations involving I.C.I.

A small prize to the reader who sends in the best story on these lines before 20th November.

I.C.I. at Brussels

WHAT is virtually a sizeable new city is rising on a 500-acre site north-west of Brussels.

This is the Brussels Universal and International Exhibition, which will run from mid-April to mid-October next year. More than fifty countries are taking part in the Exhibition, and Belgium is preparing to receive an average of 175,000 visitors daily.

Great Britain will have two pavilions. One is sponsored by the Government, the other will house the exhibits of between 70 and 80 private firms. With a 1600 sq. ft. stand just inside the main entrance to the British industries pavilion, I.C.I. will be in a commanding position.

The general theme of the I.C.I. stand, which is being designed by George Collett, will be the Company's contribution to British scientific research and development. Dominating the stand will be the huge glass figure of a man, symbolising human dependence on science—and particularly on chemistry—for food, clothes, health, comfort and employment. This is being designed by Lynton Lamb, the versatile artist whose new design for the 6d. airletter stamp was issued recently.

Scholar Son

THE kind of success that every father wants for his son has come to ANDREW L. WHITE, whose father is a chargehand at Plastics Division's Darwen Works.

When he was 17 he won a State scholarship to Jesus College, Oxford. After two years there he spent a year in Germany, teaching English and studying German.

Leaving Oxford with an honours degree, he was awarded a Rotary International Fellowship which made it possible for him to spend a year at Munich University. Now, at 26, he is trying to decide which to accept of the two American scholarships he has won —to Harvard and to Stamford universities.

Mr. White senior (his brother is the well-known sports writer Crawford White) is proud of his son's achievements, but admits that they have meant many sacrifices and much hard work. Nor are these at an end, it seems. A second son, Keith, is now at Oxford, and Janice, aged 12, is at Darwen Grammar School.

Cheerful Trading Results

THE trading results of I.C.I. and all its subsidiary companies at home and overseas, including for example Canadian Industries Ltd. and I.C.I. of Australia and New Zealand Ltd., for the first six months of this year show an increase in the money value (in these days of inflation not, of course, the same thing as an increase in volume) of sales to external customers; these sales amounted to £235 million as compared with £221 million in the corresponding period of 1956.

Group income after taxation for the same period was also up—from £14·4 million to £16·7 million. The reaction on the Stock Exchange to these results

was favourable, and shares rose a few pence. Top price so far for I.C.I. ordinary shares this year was 46s. 6d., reached on 7th May, and bottom price 37s. 1½d., recorded on 15th October.

End of the Ley

OLDER members of the Alkali Division's headquarters staff must have had mixed feelings recently as they watched construction work begin on the site of their new offices at Winnington.

As local residents they will feel, perhaps, a twinge of regret at the disappearance of Winnington Lodge, or The Ley, as it has come to be known. This venerable mansion surrounded by trees has been part of the Winnington scene for more than 150 years. Now it has to come down to make way for the modern office block that will accommodate 700 of the Division's staff.

The Ley was the home of the Rev. Jonah Furey in 1807. He was a member of the family which gave its name to the Furey salt mine, long ago submerged after a change in the course of the River Weaver. For many years the Ley was the home of the late T. H. FORGAN, the first secretary of Brunner, Mond & Co. and a director from 1890 to 1918. Later it was a school.

* * *

More recently it has been used as a meeting place by several local organisations, including branches of the St. John Ambulance Brigade and the British Legion.

Although the old building will disappear, its wooded setting will remain, for it is hoped that many of the large trees on the site will be preserved. Much thought generally has been given to the appearance of the new building and its surroundings, and there has been close co-operation with the town planning authorities.

A local newspaper, *The Northwich Guardian*, remarks: "Winnington is fortunate in that I.C.I. enhance, rather than disfigure, any site on which they build."

Moving Day in Sydney

THE Sydney staff of I.C.I.A.N.Z. have now settled down in their new ten-storey office block.

One Friday they were working as usual in their crowded offices scattered through three buildings in the city. On the following Monday they were all under one roof in the new I.C.I. House on Macquarie Street, sitting at brand-new desks and looking out on magnificent views of the harbour.

A keen observer of the details of the moving operation was I.C.I.A.N.Z.'s Melbourne property manager, who will be facing the same problems when the Melbourne staff move into their new skyscraper next year.

Slowcoach Chess

MEMBERS of Dyestuffs Division at Blackley and of Metals Division at Witton are engaged in a chess match that will take at least six months to complete.

The match is being played by correspondence, with each Division fielding a team of six. The captains are MR. A. LEESE of Kynoch Works and MR. K. M. MCCAW of Blackley Secretary's Department.

Each player plays two games simultaneously. He makes a move on each board and sends them in an envelope through the Company post to his opponent.

Mr. McCaw, who pioneered inter-Divisional telephone chess three years ago, sees no reason why there should not be an I.C.I. correspondence chess championship. If any I.C.I. teams are interested they should write to him direct at the Secretary's Department, Hexagon House, Blackley.

Maize Discovery

AN important discovery that will put new life into maize-growing in South Africa has been made recently by DR. N. J. VILJOEN, technical service manager of the A.E. & C.I. sales subsidiary Kynoch Ltd.

Farmers in South Africa's main maize-growing areas have been losing millions of pounds through an ailment of the maize plant called "yellowing." It affects the leaves, and even if the plant recovers it remains stunted.

The symptoms pointed to a deficiency of one of the trace elements—magnesium, manganese, or possibly zinc. These elements, alone and in combination, were applied to the maize plants as a spray, but without success.

Dr. Viljoen had a hunch that a trace element added to the soil might give better results, and he found by experiment that if the soil was dressed with zinc at the time of planting the maize remained healthy. A trip to America confirmed his discovery. Chlorosis of maize there had been cured with zinc, which was only effective if applied to the soil before or during planting.

Full-scale trials were laid down in South Africa, with spectacular results. A dressing of zinc sulphate increased the yield of maize threefold. The Kynoch research department also branded certain maize varieties as particularly susceptible to zinc deficiency.

Dr. Viljoen is one of the best-known soil chemists in South Africa. He served with the Department of Agriculture before joining Kynoch Ltd. in 1948.

Holiday Article Competition

ENTRIES for the Holiday Article Competition are now being judged. They come from I.C.I. factories and offices all over England and from countries as far apart as West Africa and the U.S.A. Skin diving, steeplejacking and magic are among the holiday pastimes they describe.

The results of the competition will be given in next month's *Magazine*.

50,489 *get Profit Shares*

THIS year a total of 50,489 I.C.I. employees, of whom 37,143 are payroll members, qualified to have stock handed over to them under the Profit Sharing Scheme in respect of the bonus year 1956. Altogether £1,680,958 in stock was handed over to those qualifying for 25 or more shares.

Pensions and Assistance Funds Department give the following figures for the bonus year 1956 with comparative figures for 1955:

	1956	1955
Number of employees who participated in the Scheme	84,816	82,442
Gross amount paid in bonus	£3,224,180	£2,941,557
Average gross bonus	£38 0s. 3d.	£35 13s. 7d.
Net amount of bonus after deduction of tax	£2,414,315	£2,243,358
Average net bonus	£28 9s. 4d.	£27 4s. 3d.
Amount of new stock allotted	£1,187,582	£999,615
Average amount of new stock allotted	£14·39	£12·29
Number of employees who qualified for 25 or more £1 units	50,489	16,777
Amount of stock handed over to employees	£1,680,958	£537,761
Average amount of stock handed over to employees	£33·29	£32·05

NEW APPOINTMENTS

Some recent appointments in I.C.I. are:

The Regions
Mr. G. W. Innes. Manager, Northern Region.

I.C.I.A.N.Z.
Mr. J. K. Grant. Controller, Alkali Group.

I.C.I. (China)
Mr. J. Hackney. A director.

OBITUARY

Dr. K. W. Young

We regret to announce the death on 19th September of Dr. K. W. Young, technical director of General Chemicals Division.

Dr. Young died suddenly in Austria at the beginning of a holiday. He was 51.

In his 28 years' service Dr. Young had gained wide experience of the Company's activities. To this he added an originality of thought and clear judgment which gave much weight to his counsel.

He began his career as a research chemist with Synthetic Ammonia and Nitrates Ltd., but was moved to General Chemicals Division after three years. He served at Cassel Works, the Division Technical Department and Pilkington-Sullivan Works and at the end of the war was seconded for a period to the chemical industries branch of the Allied Control Commission in Germany. He was appointed to the Division board in 1948 and was appointed successively Development Director, Commercial Director and Technical Director. He was also a director of C.A.C. and had at one time been on the board of the Alkali and Chemical Corporation of India Ltd.

NEWS IN BRIEF

TV AUDIENCE. I.C.I.'s first 15-minute television advertising feature was seen in approximately 682,000 homes, according to a firm of audience measurement specialists.

GARDEN PRIZE. A Stowmarket pensioner of Paints Division won the Gipping R.D.C. silver challenge bowl for the best-kept council house. His name: Mr. Charlie Greengrass.

FARMERS' TV FARE. Mr. R. A. Hamilton of C.A.C. spoke on grassland management in the second of the B.B.C.'s television programmes for farmers.

NOBEL ATHLETES. Ardeer Recreation Club athletes finished first at nearly 50 events at sports meetings in Scotland during the summer.

'DRIKOLD' SALES. Despite a generally cold summer, Billingham achieved record sales of 'Drikold.' Heavier demands from ice cream manufacturers and new users in the engineering industry are the reason.

FLYING TYPIST. Miss Dorothy Rostik, a senior shorthand typist in A.E. & C.I., has flown solo and obtained her student pilot's licence in five weeks.

BIG BANG. More than 1,000,000 tons of blasting explosives have been made at Ardeer since 1873—enough to blast more than one cubic mile of rock.

FIRE-FIGHTERS. A Billingham team of volunteer part-time firemen from Gas and Power Works won first place in the four-man hydrant drill at the Industrial Fire Protection Association's annual competition.

£110 IDEA. An I.C.I.A.N.Z. Fabrics Division spreading machine operator won £110 for a suggestion concerning the coating of paper with nitrocellulose.

FILM FOR POSTERITY. A colour film made by the Billingham Film Unit of the Queen's visit to Tees-side last year has been selected for inclusion in the National Film Archive.

MAKING PLASTICS TICK (*continued from page* 367)

a satisfactory technical service organisation able to offer advice and assistance on the basis of its own experience.

Then, too, a lot of technical effort is needed before a new use for a particular plastic can be established. For instance, it might look a simple job to put polythene on the market for cold water piping. In fact, tests had to be carried out over years to make sure that polythene would in fact last in this new role, water engineers had to be roped in to try it out, specification standards had to be drawn up. All this was the job of technical service and development department.

There is no doubt that this modern conception of technical service has come to stay. It is costly, of course. Sometimes it is thoughtlessly and unnecessarily called for by the customer. Sometimes there are customers who exploit this technical service to their own selfish advantage. The service is bound, too, to be related both to the nature of the call for help and the distance from which that call is made. A technical officer could be sent to Manchester, for example, at the drop of a hat, but a call for help from a distant country would be closely integrated with other business.

Technical officers are organised in sections, product-wise. But the organisation is flexible. One technical officer or a group of technical officers will specialise, for example, in the problems of the electrical industry in relation to all the different plastics this industry needs. And the technical officers who go abroad will often be chosen more for their wide knowledge than for complete specialisation in any one field.

All this work will, of course, develop still further as the range of uses to which plastics are put grows wider and as new plastics come on to the market. Eventually, the industry looks forward to the day when it can predict the behaviour of its chemicals without the need for constant experiment in the hard school of practice. But that day is far ahead. Meanwhile a confidential, intimate relationship between polymer-maker and manufacturer—a relationship built up upon the sure knowledge that the secrets and know-how of one manufacturer are never revealed to another—continues to be the foundation on which success is built.

NEWS IN PICTURES

£1 million laboratories—1. *Lord Waverley, I.C.I.'s senior lay director, interrupted his convalescence after a serious illness to open Pharmaceuticals Division's new research laboratories at Alderley Park in Cheshire on 1st October. In the picture above part of the main block of buildings is seen through the framework of a light standard. The small mouse has been taken as a symbol of the laboratories*

Left: *Lord Waverley signs the visitors' book, watched by Mr. P. Fairhurst (architect), Sir Alexander Fleck, Mr. L. H. Williams (I.C.I. Director responsible for dyestuffs and pharmaceuticals), Mr. P. A. Smith (Chairman of Pharmaceuticals Division) and Mr. E. D. Carey (Managing Director)*

Right: *Some of the laboratory staff gather on the spiral staircase to watch the arrival of the V.I.P.s*

£1 million laboratories—2. *An aerial view of part of the 350-acre Alderley Park estate, showing the laboratory buildings sited on the edge of Radnor Mere*

Candlesticks for Mr. Cunningham. *A scheme for long service and retirement awards has been introduced by Scottish Agricultural Industries. Above: Sir Alexander Fleck presented the first award (eight Edinburgh crystal candlesticks) to Mr. H. O. Cunningham, the retiring managing director of S.A.I.*

Two-faced diesels. *The first of 12 diesels ordered by Billingham to replace the factory's existing fleet of steam locos will be delivered later this month. Our picture shows the model chosen—appropriately called "Janus"*

Rocket research. *The Minister of Supply, Mr. Aubrey Jones (fifth from left in the front row), visited Summerfield Research Station last month to see for himself the research work in the rocket field in progress there. He also watched rockets being fired on a test site in the Wyre Forest. Mr. Jones is seen here with members of the Metals Division management and workers at Summerfield*

Family affair. *Sons often follow in their fathers' footsteps, but at Billingham they go one better and have father and son working together on the same job. Above: Mr. Joe Chamberlain and his son Robert, blacksmith and striker in Commercial Works wagon shop. Right: Mr. James Rooke and his son Charlie, who have been working side by side in Dyestuffs Division's Nylon Works welding shop for the past 7 years*

'Ardil' shutdown. *Major Niall Macpherson (left), Under-Secretary of State for Scotland and M.P. for Dumfries, visited the 'Ardil' factory at Dumfries before it closed down. He is seen here with Dr. A. Caress, chairman of Fibres Division. The 220 payroll workers on the 'Ardil' plant have been offered jobs at Wilton, and housing assistance if they choose to move*

Remote control. *Nitroglycerine is now being made at Ardeer in a plant that is completely remote controlled—the Ardeer Biazzi hill. TV cameras scan the nitrating room, and what they see is relayed on to screens in the control room. The remote control panel was made in the Biazzi Company's workshops in Switzerland and instrumented in collaboration with I.C.I.*

Victory *in a "personality girl" contest at Darlington brought Billingham lab assistant Pat Taylor (right) a visit to Pinewood Studios for the Rank 21st birthday celebrations. Above: With Mrs. John Davis (Dinah Sheridan), Mr. Davis and Lady Rank*

Fair game. *These two tweedy shooting types and glamorous barmaid appear in a new I.C.I. colour film entitled "More Pheasants," which was shown at the International Conference of Game Biologists in Denmark last month*

Giant dahlias. *One of the five blooms with 14 in. bloom spans all grown from the same plant by Mr. W. G. Coleman, who works in Nobel Division's Explosive Sales Dept. His dahlia crop this year was about 160*

Peaceful coexistence. *A white rabbit calmly shares the hearthrug with a litter of hedgehogs at the Saltcoats home of Ardeer's chief physiotherapist, Mr. R. J. McD. Maxwell. The expectant mother hedgehog was found by Mr. Maxwell on the moors during a recent fishing trip*

PICTURES FROM OVERSEAS

Finland. *The President of Finland, Dr. Urko Kekkonen (right), photographed on the I.C.I. stand during the British Trade Fair at Helsinki. The fair included a miniature Lord Mayor's Show, complete with the Lord Mayor and Scottish pipers, and an air display by British jets*

Argentina. *The site of existing works at Capita by I.C.I., will be 4000 to two main shar the polyvinyl chloride factory shortly to be built by Electrochlor alongside their Bermudez, near Rosario. Initial capacity of the plant, which has been designed a year. The cost, estimated at £1¼ million, will be met largely by Electrochlor's holders, the I.C.I. subsidiary 'Duperial' and Cellulosa Argentina*

Eire. *The Chairman photographed with a bevy of girls from I.C.I.'s Dublin office at a reception in his honour during which he presented long service awards and was in turn presented with a Waterford glass decanter by the Dublin staff*

Pakistan. *A large crowd of Khewra Sod in from Rawalpindi. The fair-weathe*

Co. employees gathered to watch as the first plane ever to land in the district flew airstrip has been prepared on the company's land south-east of the limebeds

India. *An image of Saraswati, the Hindu Goddess of Learning, made by Mr. Satyanarayan Das, a messenger at A.C.C.I.'s Rishra factory. It won first prize from among 50 entries*

Rough Crossing

By Henry Maxwell

With little doubt the great gale of 1902 which blew in the Straits of Dover from Friday, 31st January, to Monday, 3rd February, was, from the point of view of cross-Channel passengers, the worst ever to be recorded.

Dover Harbour at that time was not the sheltered affair it is today. There was no Marine Station, and the Admiralty Pier at which the steamers berthed was uncovered and exposed to wind and water. The great gale developed from the east, which was the worst quarter, as the Admiralty Pier, like that at Folkestone, was designed only to give protection from the prevailing weather in the Channel, the south-west. Towards easterly weather it offered very limited protection.

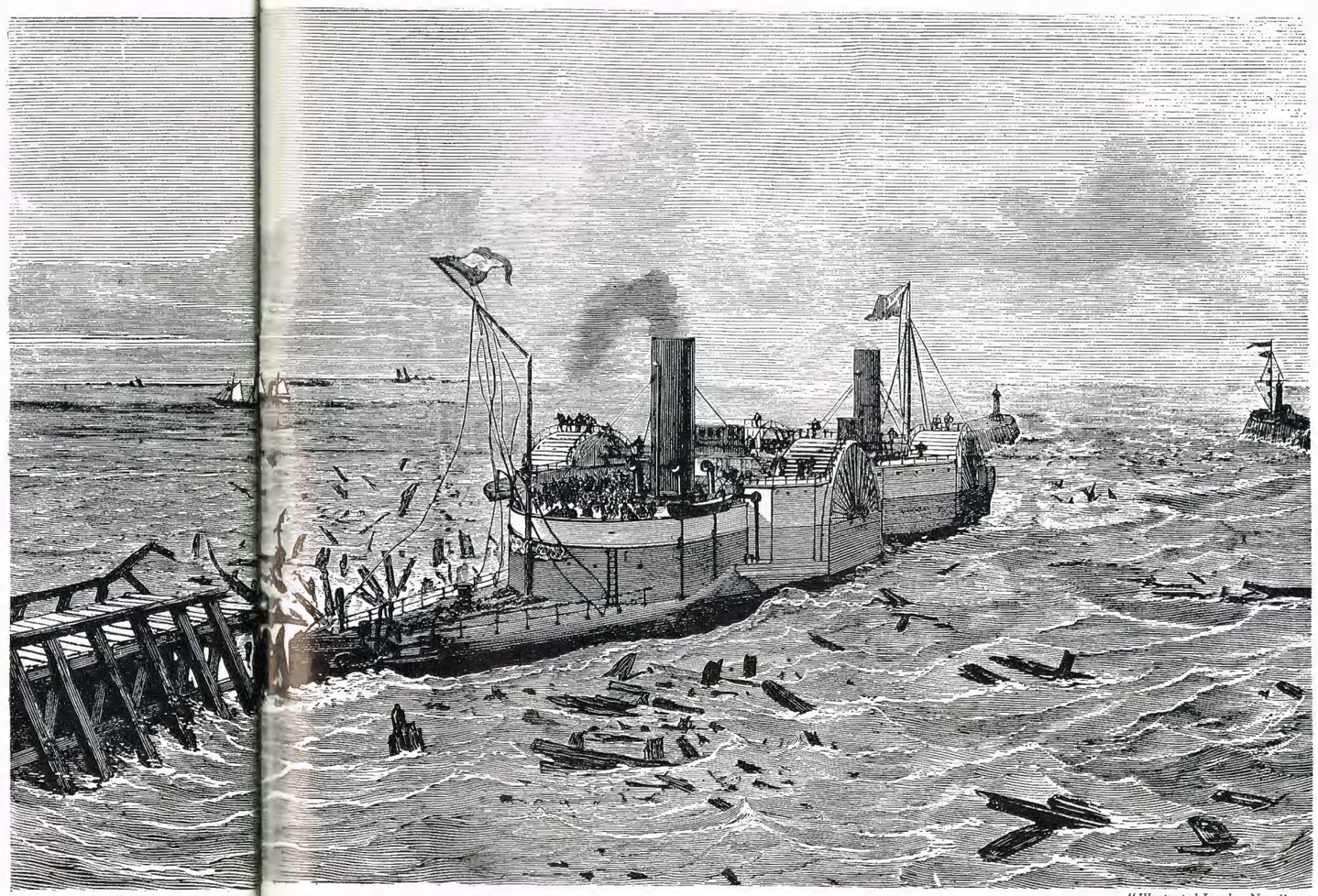
By Friday morning a very heavy and confused sea was running outside the harbour and conditions were extremely uncomfortable. When the morning boat train arrived from London spray was breaking over the pier and the paddle-steamer *Dover*, which was to take the morning service to Calais, was already heaving and labouring at her moorings. Not a few of the intending passengers took one look at the fury driving out of the east and sought shelter in the warmth and comfort of the Lord Warden Hotel. Those more intrepid or more pressed ascended the slippery rocking gangway and prepared for the rigours of the crossing.

At eleven o'clock the vessel cast off and headed for the open sea. Almost immediately she was in trouble. When just clear of the end of the pier the starboard paddle hit some floating wreckage, and after some truly alarming lurches the steamer managed to regain the harbour and make fast alongside the berth she had just left. This, owing to the exposed nature of the Admiralty Pier, was the only berth which could with any degree of safety be operated in the conditions then prevailing.

Repairs were at once set in motion, but meanwhile the morning boat from Ostend, the paddle-steamer *Marie-Henriette*, had arrived off the pier after an appalling crossing and found herself unable to berth, while at one o'clock the famous *Le Pas de Calais*, subsequently the last paddle-steamer to run on the Dover–Calais route, arrived from France and was likewise unable to enter the harbour. Both vessels stood off, and their unlucky passengers had to wait while they pitched and wallowed outside.

About three in the afternoon the *Dover* was ready to sail again. She had by now taken on the passengers from the Folkestone–Boulogne service, which had been cancelled. Shortly after 3 p.m. the *Dover* left, not for Calais as originally intended but for Boulogne, Calais having telegraphed that the port was unapproachable. At once the *Marie-Henriette* from Ostend came in, discharged her passengers and mail, and took on those voyagers who were prepared to face the return journey to Ostend in the teeth of the ever-increasing storm. There were but eighteen of them.

The vessel had been built in 1893, in Belgium. She was a powerful paddle-steamer of 1451 gross tons, about 340 ft. in length, with a speed of 22 knots. In the rapidly closing dusk of this ferocious January evening she was almost immediately lost to view as soon as she cleared the harbour. Nothing further was to be seen of her for eighteen hours.



The Bessemer saloon-ship, *seen here running foul of Calais pier on her maiden (and only) voyage in 1875. She had two funnels, four paddles, and a patent movable saloon designed by Sir Henry Bessemer.*

"Illustrated London News"

With the coming on of night, conditions became truly awe-inspiring. The noise of the gale was stupendous. Huge gusts of wind came booming out of the eastern blackness with the roar of thunder. Streaming wet under the pallid lamps of the harbour, the London train came in with the night passengers for Calais, who struggled as best they could up the canting gangway to the *Le Pas de Calais* and made their way below. The vessel cast off about 10.30, and those on shore watched with trepidation the staggering arcs made by her masthead lights as she encountered the fury of the open Channel. After a terrible crossing she arrived off Calais about 12.30 a.m., but the port authorities refused to allow her to attempt to enter. Enormous seas were sweeping green across the entrance, so that it was impossible to distinguish the jetties. She had to stand off till daylight, when by highly skilled seamanship on the part of her captain she managed to make the port. All further services were transferred to Boulogne.

When it was realised in the morning that the *Marie-Henriette* had not arrived at Ostend, the greatest anxiety prevailed.

It must be remembered that this was before the days of wireless communication. In the sickly light of dawn, as those at Dover looked out over the Straits, no

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The saloon of the "Bessemer." *It was hung on a horizontal axis and could be moved relative to the hull by hydraulic rams, which were controlled by a man watching a spirit level —an idea which merely aggravated seasickness and wrecked the ship on her maiden voyage.*

eventuality appeared impossible. Not in the lives of any of them had they beheld so wild a sea.

The first news of the missing steamer came with the arrival of the *Prince Albert*, which was bringing the night mail from Ostend. She had spoken to the *Marie-Henriette*, which was flying distress signals, off the South Foreland where she had been hove to all night to a sea anchor with her starboard paddle-wheel entirely disabled, and out of control. She requested immediate assistance but was meanwhile attempting to steer in the direction of Ostend on the port wheel, making about one knot. The vessel's reported position, so close to the dreaded Goodwin Sands, aroused the liveliest apprehensions at Dover.

When the *Prince Albert* left on the return journey to Ostend, she carried a supply of provisions which it was hoped she might be able to transfer to the distressed vessel, which must now be very short of food. The *Prince Albert* was an older and smaller ship altogether. Nowadays, when we accept dishonour so much more readily than danger, she would probably not have attempted the manœuvre whatever the plight of her consort might have been. In those days they were made of sterner stuff. The seas were now truly terrific and, in the shallows near the Goodwins, dangerously confused as well.

More than once the *Prince Albert* nearly came to grief in trying to approach the stricken *Marie-Henriette*, and the attempt to provision her had to be abandoned. The *Albert* was continually swept by heavy seas. A monster wave struck her when about mid-Channel. It wrecked the deck saloon and all the private cabins, smashing the decks below, and injuring several passengers. The *Prince Albert* was already seven hours overdue, and grave anxiety was being entertained on her account also, when to the intense relief of the authorities at Ostend she came limping in just after midnight.

It was now Sunday morning. The *Marie-Henriette* had already been at sea for two whole nights, and the gale showed little signs of moderating. In a still

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Arrival at Folkestone *of the steam packet from Boulogne, painted by J. J. Chalon in* 1867

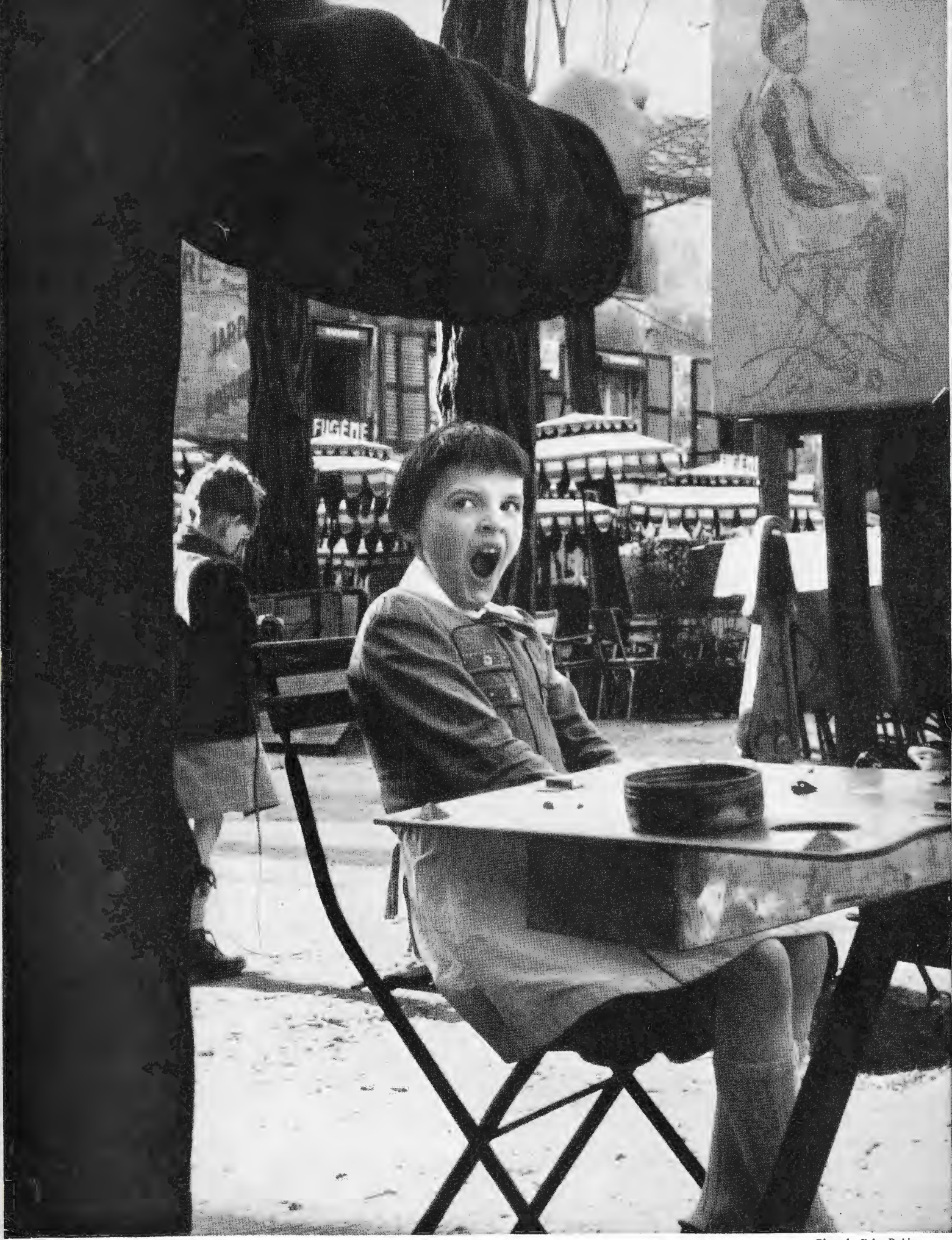
tremendous sea the sister vessel *Princesse Clémentine*, on the afternoon passage to Dover, encountered the disabled steamer when about two hours out of Ostend. Government tugs were standing by her but owing to the high seas had been unable to take her in tow. The Captain of the *Princesse Clémentine* brought his ship round in the hope of making a lee and lowering a lifeboat, but the hazards were too great and the attempt had to be called off.

The great gale was now, however, blowing itself out. At noon the old paddle-steamer *La Flandre* had been sent out from Ostend with fuel and provisions. When she reached her crippled consort the *Marie-Henriette* had drifted back to near the East Goodwin lightship. Returning to Ostend that night the *Flandre* was able to report that although the approach to the *Marie-Henriette* had been exceedingly hazardous, and both vessels had been repeatedly washed clean by heavy seas, she had succeeded in passing over a sack of provisions.

The *Marie-Henriette* was by now running short of fuel as well as food. Her captain had demanded a supply of coal, but it had proved impossible to effect a transhipment. Shortly afterwards, however, the tugs had at last been able to pass a line, and the slow, difficult tow towards Ostend began. For the unfortunate passengers on the disabled vessel it meant yet another night at sea. This was their third. During this night the fuel on the escorting tugs also began to run out, and shortly before dawn they had perforce to abandon their tow. To those on the *Marie-Henriette*, if they were any longer capable of sensation, it must have seemed the last straw.

With the first light, however, came the faithful *Flandre* once more, and in the by now moderating weather she was able very shortly to restart the tow. By seven o'clock the bedraggled convoy was off Ostend harbour, and shortly afterwards the dreadful ordeal of the passengers was over.

They had been at sea sixty-five hours instead of the normal three and three-quarters! No wonder that among the longshoremen and the old cross-Channel sailors of Dover the great gale of January 1902 is still spoken of with shuddering respect.



"The Model"

Photo by John Doidge